CUSTOMER NO.
34456

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant:	Timothy K. Searfoss		
Title:	TRAILER COVER SYSTEM		
App. No.:	10/664,806	Filed:	09/17/2003
Examiner:	GUTMAN, Hilary L.	Group Art Unit:	3612
Atty. Dkt. No.:	3000/22	Confirmation No.:	3469

M/S APPEAL
The Board of Patent Appeal and Interferences
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF IN SUPPORT OF APPEAL

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This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. § 41.37(c)(1)):

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APPENDICES

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I. REAL PARTY IN INTEREST (37 C.F.R. § 41.37(c)(1)(i))

The real party in interest in this appeal is Roll-Rite LLC, (formerly known as Roll Rite Corporation), the assignee, as evidenced by the assignment recorded at Reel 015386, Frame 0484.

II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. § 41.37(c)(1)(ii))

There are no interferences or other appeals that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS (37 C.F.R. § 41.37(c)(1)(iii))

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

There are thirty-three (33) claims in the application (claims 1-33).

B. STATUS OF ALL THE CLAIMS

1. Claims pending:

   Claims 1-33.

2. Claims withdrawn from consideration but not canceled:

   NONE.

3. Claims allowed:

   NONE.

4. Claims objected to:

   NONE.

5. Claims rejected:

Claims 1-5, 7-8, and 11 are rejected under 35 U.S.C. § 102(e).

Claims 1 and 6 are rejected under 35 U.S.C. § 103(a).

Claims 12-16, 18-19, 22-27, 29-30, and 33 are rejected under 35 U.S.C. § 103(a).

Claims 12, 17, 23, and 28 are rejected under 35 U.S.C. § 103(a).

Claims 9 and 10 are rejected under 35 U.S.C. § 103(a).

Claims 20-21 and 31-32 are rejected under 35 U.S.C. § 103(a).

6. Claims canceled:

NONE

C. CLAIMS ON APPEAL

There are thirty-three (33) claims on appeal, claims 1-33.

IV. STATUS OF AMENDMENTS (37 C.F.R. § 41.37(c)(1)(iv))

No amendments have been submitted subsequent to the Office Action mailed January 10, 2006.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER (37 C.F.R. § 41.37(c)(1)(v))

The invention is a rail 38 for a top of a wall 34 of a trailer. The rail 38 comprises a body adapted to engage the top of the wall 34. The body has a concave surface 56 adapted to receive a cover reel 32:

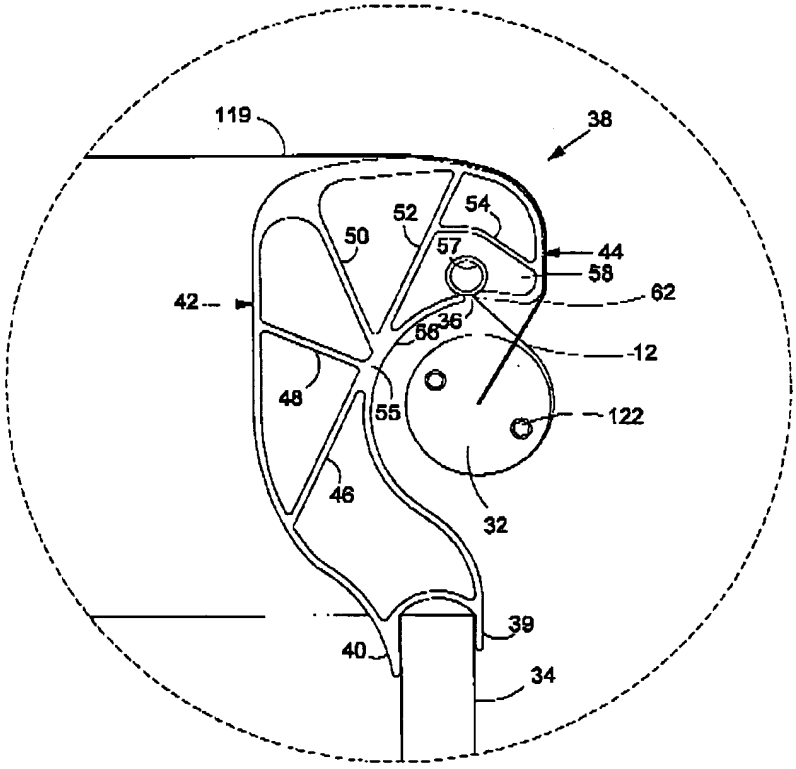

FIG. 3

All of the independent claims recite "a body adapted to engage the top of the wall" and/or the body "having a concave surface."

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL (37 C.F.R. § 41.37(c)(1)(vi))

A. Independent claims 1, 12 and 23 were rejected either alone (claim 1) or in combination with a secondary reference (claims 12 and 23) under §102(e) over U.S. Patent No. 6,513,856 to Swanson et al. (Appendix B).

B. Claim 1 was also rejected under §103(a) over U.S. Patent No. 4,505,512 to Schmeichel et al. (Appendix C) in view of DE 101 20 442.

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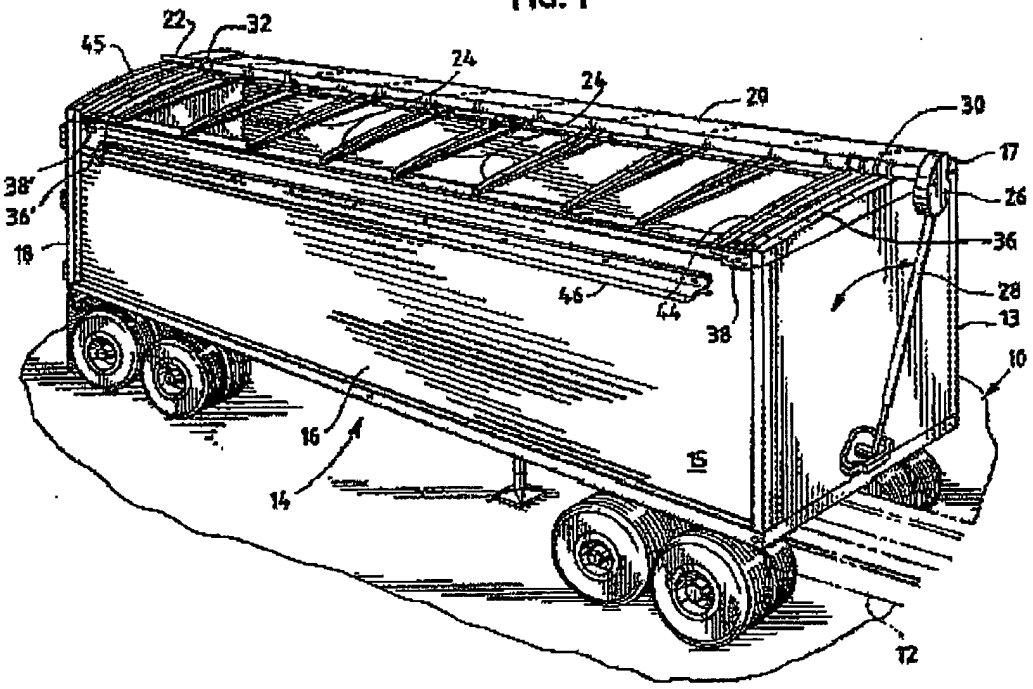
VII. ARGUMENTS (37 C.F.R. § 41.37(c)(1)(vii))

Based on the arguments and issues below, the claims do not stand or fall together, each of the independent claims has a unique set of issues relating to its rejection and appeal:

A. Swanson's Ledge Engages The Side of the Trailer, Not the Top

The Examiner maintains that a ledge 46 of Swanson et al. '856 "as broadly recited and interpreted is [ ] attached at the top of the trailer." *Office Action mailed Jan. 10, 2006 at page 7.*

FIG. 1

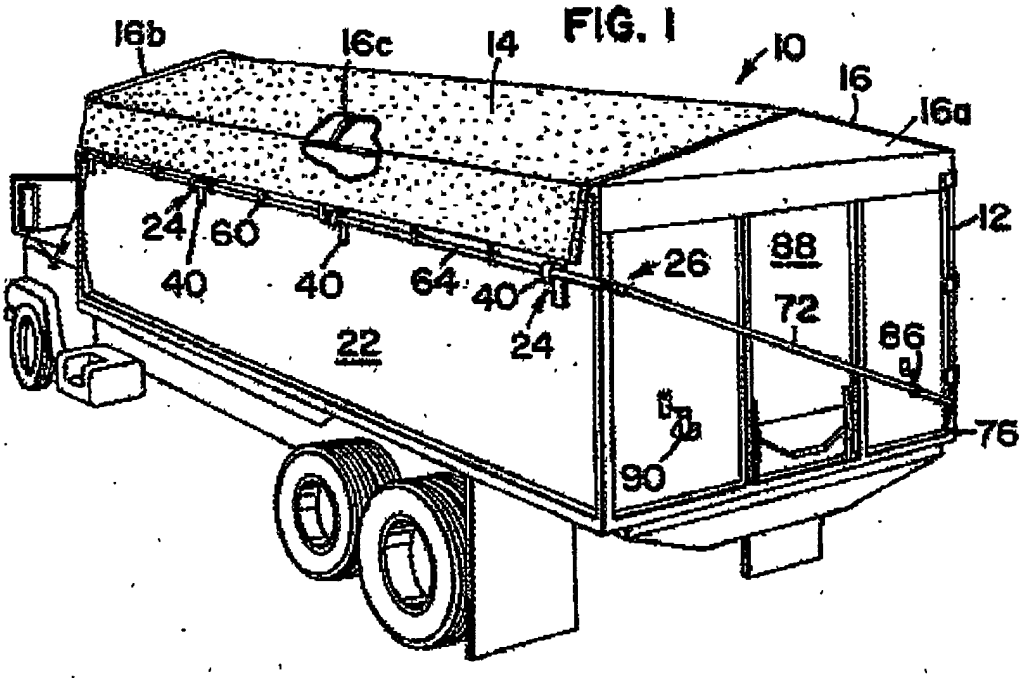


The first issue in this appeal is whether the ledge 46 of Swanson et al. '856 engages the top of the wall.

The ledge 46 of Swanson et al. '856 is plainly situated some distance from the top of the wall. See Figures 1 and 6. The specification does not suggest anything else: "[L]ongitudinal latch plate or ledge 46 [is] attached on side 15 near second lengthwise edge 19 of the container 16." Swanson et al. '856 (Appendix B) at column 5, lines 63-65.

B. Schmeichel et al.'s Hooks Engage The Side of the Trailer, Not the Top

In a rejection made for the first time, the Examiner asserts without detail that Schmeichel et al. '512 "disclose the claimed invention [of claim 1] except for a plurality of ribs." *Office Action mailed Jan. 10, 2006 at pages 3-4.* This reference is apparently to hooks 40:



The second issue in this appeal is whether the hooks 40 of Schmeichel et al. '512 engage the top of the wall.

As in Swanson et al. '856, the hooks 40 of Schmeichel et al. '512 are situated well below the top of the wall: "hooks 40 [are] attached at spaced intervals to the side 22 opposite the side 18 of the truck box 12 ... The hooks 40 are suitably secured to the truck box side wall 22 below the top edge thereof." Schmeichel et al. '512 (Appendix C) at column 4, lines 24-33.

VIII. APPENDIX OF CLAIMS INVOLVED IN THE APPEAL (37 C.F.R. § 41.37(c)(1)(viii))

The text of each claim involved in the appeal is as follows:

1. (Original) A rail for a top of a wall of a trailer, the rail comprising:
   a body adapted to engage the top of the wall, the body having a concave surface adapted to receive a cover reel.

2. (Original) The rail of claim 1 wherein the concave surface faces away from the trailer.

3. (Original) The rail of claim 1 further comprising at least one leg connected to the body.

4. (Original) The rail of claim 3 wherein the at least one leg is adapted to engage the top of the wall.

5. (Original) The rail of claim 3 wherein the at least one leg is adapted to be welded to the top of the wall.

6. (Original) The rail of claim 1 wherein the body comprises a plurality of ribs.

7. (Original) The rail of claim 1 wherein the body includes an opening adapted to anchor a cover.

8. (Original) The rail of claim 1 wherein the body extends at least a majority of a length of the wall of the trailer.

9. (Original) The rail of claim 1 wherein the body comprises aluminum.

10. (Original) The rail of claim 1 wherein the body comprises a polymer.

11. (Original) The rail of claim 1 wherein the body is extruded.

12. (Original) An apparatus for extending and retracting a cover over a trailer, the apparatus comprising:

a base pivotably connected to the trailer;

an extension connected to the cover and pivotably connected to the base; and

a rail for a top of a wall of the trailer, the rail including a body adapted to engage the top of the wall, the body having a concave surface adapted to receive a cover reel.

13. (Original) The apparatus of claim 12 wherein the concave surface faces away from the trailer.

14. (Original) The apparatus of claim 12 further comprising at least one leg connected to the body.

15. (Original) The apparatus of claim 14 wherein the at least one leg is adapted to engage the top of the wall.

16. (Original) The apparatus of claim 14 wherein the at least one leg is adapted to be welded to the top of the wall.

17. (Original) The apparatus of claim 12 wherein the body comprises a plurality of ribs.

18. (Original) The apparatus of claim 12 wherein the body includes an opening adapted to anchor the cover.

19. (Original) The apparatus of claim 12 wherein the body extends at least a majority of a length of the wall of the trailer.

20. (Original) The apparatus of claim 12 wherein the body comprises aluminum.

21. (Original) The apparatus of claim 12 wherein the body comprises a polymer.

22. (Original) The apparatus of claim 12 wherein the body is extruded.

23. (Original) An apparatus for extending and retracting a cover over a trailer, the apparatus comprising:

a base pivotably connected to the trailer;

an extension connected to the cover and pivotably connected to the base;

a reel connected to the extension;

a motor mounted on the extension and drivingly engaged with the reel to selectively extend and retract the cover over the trailer; and

a rail for a top of a wall of the trailer, the rail including a body adapted to engage the top of the wall, the body having a concave surface adapted to receive the reel.

24. (Original) The apparatus of claim 23 wherein the concave surface faces away from the trailer.

25. (Original) The apparatus of claim 23 further comprising at least one leg connected to the body.

26. (Original) The apparatus of claim 25 wherein the at least one leg is adapted to engage the top of the wall.

27. (Original) The apparatus of claim 25 wherein the at least one leg is adapted to be welded to the top of the wall.

28. (Original) The apparatus of claim 23 wherein the body comprises a plurality of ribs.

29. (Original) The apparatus of claim 23 wherein the body includes an opening adapted to anchor the cover.

30. (Original) The apparatus of claim 23 wherein the body extends at least a majority of a length of the wall of the trailer.

31. (Original) The apparatus of claim 23 wherein the body comprises aluminum.

32. (Original) The apparatus of claim 23 wherein the body comprises a polymer.

33. (Original) The apparatus of claim 23 wherein the body is extruded.

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IX. EVIDENCE APPENDIX (37 C.F.R. § 41.37(c)(1)(ix))

Appellant entered no evidence pursuant to §1.130, 1.131 or 1.132, and the Examiner entered no evidence that was relied upon by Appellant.

X. RELATED PROCEEDINGS APPENDIX (37 C.F.R. § 41.37(c)(1)(x))

There are no decisions rendered by a court or interferences or other appeals that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal.

XI. CONCLUSION

The Examiner maintains that the references show something that they plainly do not. The final rejection of claims 1-33 should be reversed. For at least the reasons given above, all pending claims are allowable and the Appellant therefore respectfully request reconsideration and allowance of all claims and that this patent application be passed to issue.

Respectfully submitted,

10 APRIL 2006
Date

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APPENDICES

Appendix B – U.S. Patent No. 6,513,856, to Swanson et al.

Appendix C – U.S. Patent No. 4,505,512, to Schmeichel et al.

APPENDIX B

United States Patent [19]

Schmeichel et al.

[11] **Patent Number: 4,505,512**

[45] **Date of Patent: Mar. 19, 1985**

[54] **ROLL-UP TARP APPARATUS**

[76] Inventors: **Steven C. Schmeichel; Charles M. Schmeichel, both of Hwy. 20, Jamestown, N. Dak. 58401**

[21] Appl. No.: **447,291**

[22] Filed: **Dec. 6, 1982**

[51] Int. Cl.³ B60P 7/02

[52] U.S. Cl. 296/98; 135/89; 160/238; 160/309

[58] Field of Search ..... 296/98, 100; 135/5 A, 135/5 AT, 89; 160/238, 309

[56] **References Cited**

U.S. PATENT DOCUMENTS

1,322,326	11/1919	Miller	296/100
2,743,132	4/1956	Zahn	296/100
3,384,413	5/1968	Sargent	296/98
3,467,431	9/1969	Turcotte	296/98
3,494,658	2/1970	Maes	296/100
3,667,802	6/1972	Love	296/98
3,785,694	1/1974	Sargent	296/98
3,942,830	3/1976	Woodard	296/105
4,014,590	3/1977	Schulz	296/100
4,030,780	6/1977	Petretti	296/100
4,212,492	7/1980	Johnsen	296/98
4,302,043	11/1981	Dimmer et al.	296/98

OTHER PUBLICATIONS

Brochure entitled Eqy-Roll Tarp System by Lode-King Ltd.

Brochure entitled Sidewinder by Koffler's and Michael's.

Brochure entitled Snaplock by Aero Industries, Inc.

Brochure entitled Roll-Tight by Frontier Inc.

Primary Examiner—Richard A. Bertsch

Attorney, Agent, or Firm—Merchant, Gould, Smith, Edell, Welter & Schmidt

[57] **ABSTRACT**

A roll-up tarp assembly (10) for an open truck box or trailer (12). The roll-up tarp assembly (10) includes a tarp (14) made from a flexible material. The tarp (14) is securedly attached along one side to the top of the truck box (12). The other side of the tarp is attached to a roll bar (64) by a plurality of flexible straps (60). A crank apparatus (26) connected to the roll bar (64) by a U-joint (74) and collar (80) assembly is utilized to roll the tubular member transversely of the truck box opening so as to enclose the truck box (12) with the tarp (14) or uncover the truck box (12). A plurality of hooks (40) are attached to the side of the truck box (12) opposite of the side to which the tarp (14) is fixedly secured. The hooks (40) retain the roll bar (64) when the tarp (14) is covering the truck box (12).

14 Claims, 8 Drawing Figures

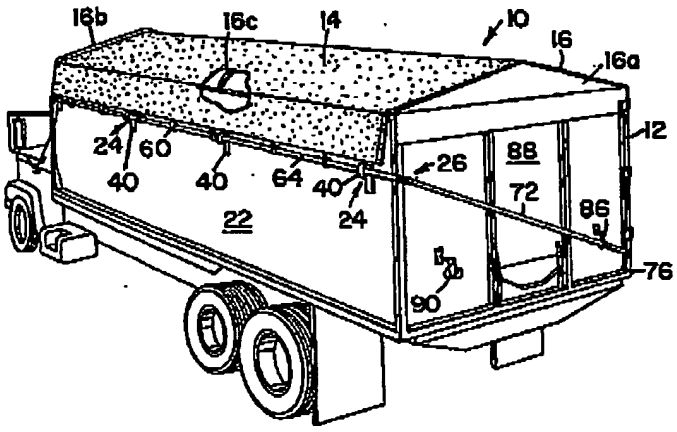
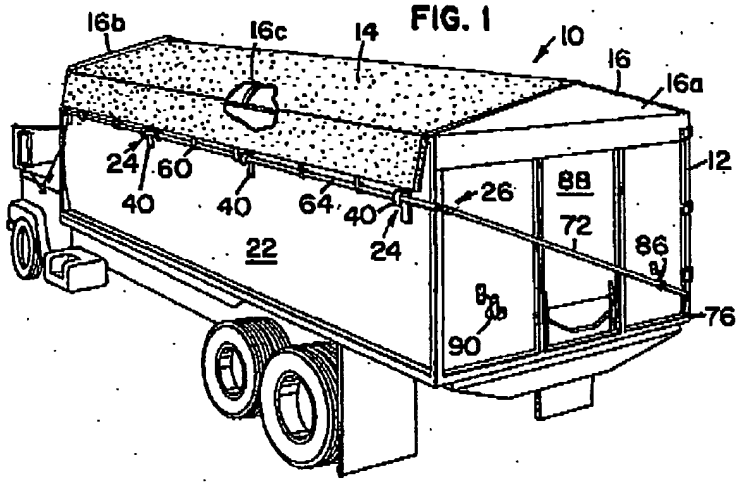


FIG. 1


16b
16c
14
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16
16a
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64
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88
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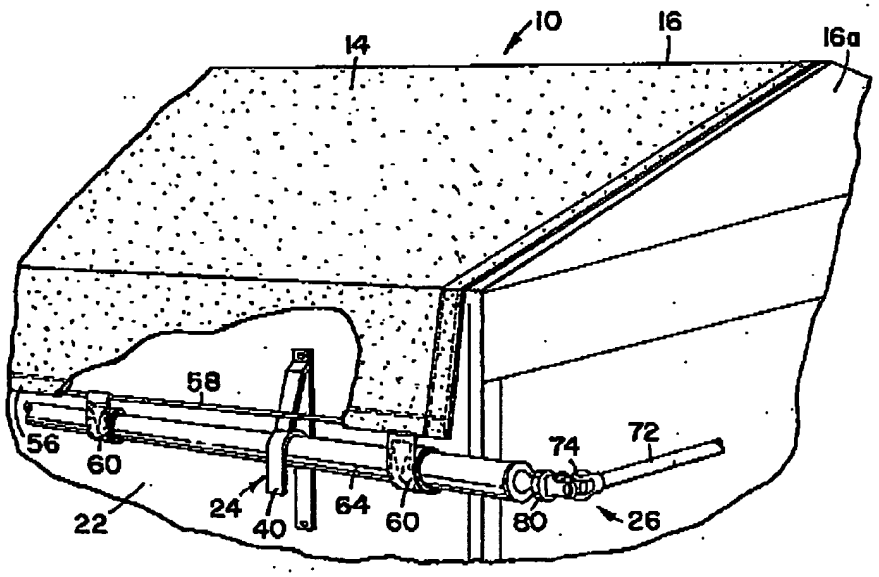
76
90


14
10
16
16a
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56
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22
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74
72
80
26

FIG. 3

FIG. 4

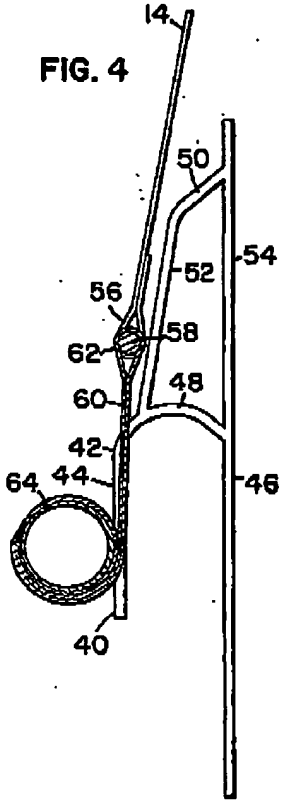


FIG. 5

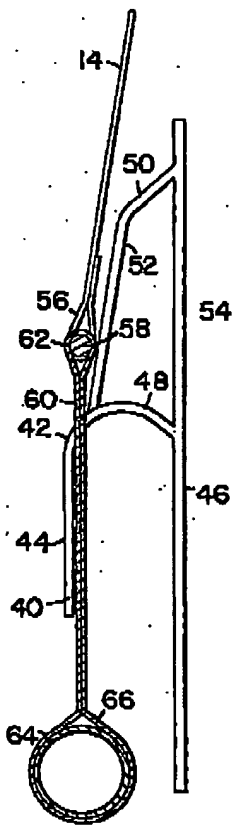
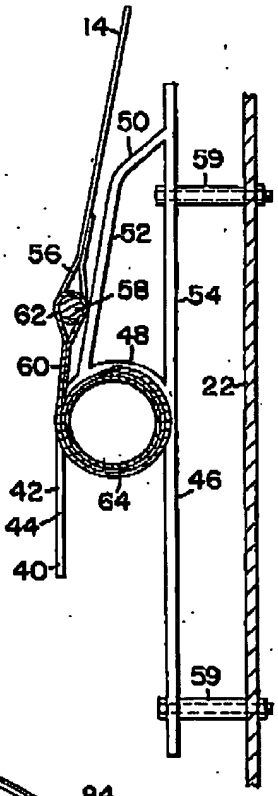


FIG. 6



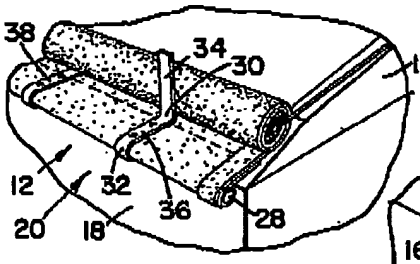


FIG. 2

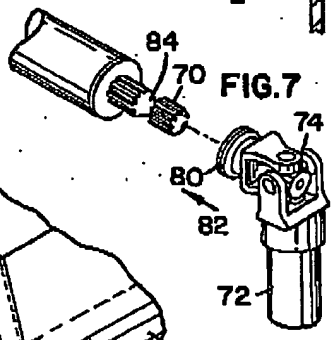


FIG. 7

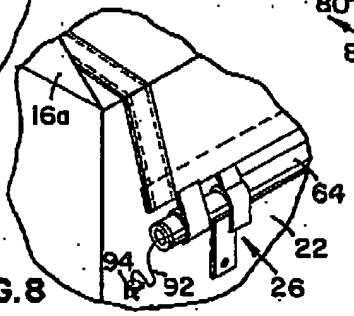


FIG. 8

ROLL-UP TARP APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to a removable cover assembly for open containers or the like. More particularly, the present invention relates to a roll-up tarp apparatus for an open truck box or trailer.

Roll-up tarp apparatus for truck and trailer bodies having an open top are widely utilized in the trucking industry. For example, U.S. Pat. No. 4,302,043 discloses a roll-up tarp for trailers having a tarp secured to one longitudinal top edge of the truck box or trailer while the opposite edge of the tarp is affixed to a tube which extends the length of the trailer. The rear of the tube is attached to a universal joint which in turn is attached to a crank handle such that the tube can be rolled transversely across the top of the truck box. When the tarp is unrolled, the tube rolls over a latch plate attached along the longitudinal top edge of the truck box on the opposite side of the vehicle from where the tarp is secured. The tube is then wound in an opposite direction such that the tarp is wedged between the latch plate and the truck.

This method of securing the tarp in a covered position has several problems associated with it, some of which are discussed below. Firstly, there is a problem with tarp wear as the tarp is constantly rubbing against the latch plate and the truck box when in the covered position. Additionally, during the wedging process, the fabric has a tendency to pinch and bunch up between the tube and the plate so as to create a force opposing the tightening of the tarp. This makes it difficult to fully tighten the tarp and frequently results in a tarp which is not very tight. Furthermore, the tarp has a tendency to loosen during transit. This is especially true if an excessive amount of cargo is loaded into the truck box so as to be heaped above the height of the framework which supports the tarp. During transit, the load will settle resulting in a loose tarp which may accidentally release causing a road hazard. The binding of the tarp between the roll tube and the latch plate further creates an unwanted strain on the crank handle so as to cause a spring-loaded effect which makes the handling of the crank handle somewhat hazardous when releasing the crank handle from the retainers at the back of the truck.

U.S. Pat. No. 4,212,492 discloses a roll-up cover apparatus which is retained in a covered position by straps which must be individually attached to the side of the vehicle and tightened. In addition to other problems, tightening of the individual straps is time consuming and often does not result in a uniformly tight cover apparatus.

The present invention solves these and many other problems associated with the art.

SUMMARY OF THE INVENTION

The roll-up tarp apparatus of the present invention includes a tarp made from a flexible material. The tarp has a length approximate to that of the truck box and a width greater than that of the truck box. The tarp is fixedly secured along one side edge to the top edge of one side of the truck box. A tubular member is attached to a second side edge of the tarp by a plurality of elongated, flexible straps. A plurality of hooks positioned along the side of the truck box opposite from the side where the tarp is fixedly secured, are utilized to retain the tubular member when the tarp is in a covered position. A crank apparatus is suitably attached to one end of the tubular member for rolling the tubular member across the truck box. As the tubular member is rolled, the tarp either rolls up on the tubular member so as to uncover the truck box, or unrolls from the tubular member so as to cover the truck box.

An advantage of one embodiment of the present invention is that the covering and uncovering of an open truck box may be readily accomplished by one individual. Furthermore, the straps retaining the tarp in the covered position are simultaneously tightened and loosened by a strap tightener/loosener apparatus which in operated from one location.

An advantage of yet another embodiment of the present invention is that the tubular member is attached to the tarp by a plurality of web straps such that the tubular member is not directly attached to the tarp but displaced therefrom. The outer surface of the tubular member slides on the hooks utilized to retain the tarp a covered position, with little resistance. This results in a tightening method which assures maximum tightness as there is minimum friction or resistance to overcome and which results in minimum tarp wear as the tarp does not engage the hooks or the tubular member.

A further advantage of an embodiment of the present invention is that accidental release, even when heaping of a load occurs, is minimized. The legs of the generally U-shaped hooks extend downward and are of a sufficient length such that should the tarp loosen due to settling of the heaped load, the tubular member will still be retained by the legs of the hooks.

Furthermore, there is little or no strain imparted on the crank handle due to the tarp binding, thus doing away with any spring loaded effect on the handle. Consequently, releasing the crank handle from the retainers at the back of the truck is a less hazardous operation.

Another advantage of one embodiment of the present invention is the presence of a strap tightening and loosening apparatus which is capable of tightening a plurality of straps for retaining the tarp in a tant, covered position. An enlongated roll bar which is attached to the straps along one side edge of the tarp cooperates with brackets positioned along the side of the vehicle, such that by rolling the roll bar in one direction, the straps are tightened, and by rolling the roll bar in an opposite direction, the straps are loosened.

Additionally, in one embodiment of the invention, the roll bar functions both as an apparatus for rolling or unrolling the tarp and as a wrench-like apparatus for simultaneously tightening or loosening a plurality of straps attached to the edge of the tarp.

In yet another embodiment of the present invention, a U-joint and locking collar assembly is utilized which allows quick attachment of a crank handle to the tubular member. Furthermore, in one embodiment, a spline shaft is utilized which enables adjustment of the crank handle such that the tarp is sufficiently extended or tightened when the handle is in a stored position.

These and various other advantages and features of novelty which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and objects obtained by its use, reference should be had to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there is illus-

trated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, in which like reference numerals and letters indicate corresponding parts throughout the several views,

FIG. 1 is a view in perspective with portions removed of a truck box utilizing the preferred embodiment of the present invention;

FIG. 2 is a partial perspective view of the longitudinal edge of the tarp of the preferred embodiment which is fixedly secured to the truck box;

FIG. 3 is a partial perspective view with portions removed showing the hold down apparatus of the preferred embodiment of the present invention;

FIG. 4 is a side elevational view of the hook apparatus of the preferred embodiment of the present invention illustrating the roll tube being unrolled from or rolled onto the strap-like members;

FIG. 5 is a similar view showing the roll tube suspended from the end of the strap-like members;

FIG. 6 is a similar view illustrating the roll tube being retained by the hook apparatus and illustrating the hook apparatus offset from the side of the truck box;

FIG. 7 is a partial perspective view of the U-joint assembly of the preferred embodiment of the present invention; and

FIG. 8 is a partial perspective view of the stretch cord attachment of the preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the drawings, there is illustrated in FIG. 1 the preferred embodiment of the roll-up tarp apparatus of the present invention, the roll-up tarp apparatus being generally designated by the reference numeral 10. It will be appreciated, that while the roll-up tarp apparatus 10 is shown utilized with an open truck box or trailer 12, the present invention has application to other large containers having an open top requiring an easily and readily removable covering. The roll-up tarp apparatus 10 includes a flexible cover or tarp 14 which is stretched over and supported by a framework 16 suitably attached to the top of the truck box 12. As illustrated in FIG. 2, the tarp 14 is fixedly secured to the top edge of a longitudinal side 18 of the truck box 12 by a hold down apparatus generally designated by the reference numeral 20. The other longitudinal edge of the tarp 14 is releasably secured to a side 22 of the truck box 12 by a hold-down apparatus generally designated by the reference numeral 24 as illustrated in FIG. 3. The roll-up tarp apparatus 10 further includes a crank apparatus 26 for rolling and unrolling the tarp 14.

More particularly, as illustrated in FIGS. 1 through 3, the framework 16 includes front, back and intermediate members 16*a,b,c* which extend from the side 18 to the side 22 of the truck box 12. The framework members have a generally triangular shape to insure that the tarp 14 is supported above the load. The front and back members 16*a,b* are solid so as to cooperate with the tarp 14, and completely enclose the truck box 12. The framework 16 is preferably made from a material sufficiently rigid to support the tarp 14, and yet sufficiently light to as to not add appreciable weight to the load. It will be appreciated, that other suitable framework may be utilized in keeping with the principles of the present invention.

As illustrated in FIG. 2, the tarp 14 is fixedly secured along a longitudinal edge thereof to the top of the side 18 by the hold-down apparatus 20. In the preferred embodiment illustrated, the hold-down apparatus 20 includes a hollow tube 28 positioned in a hem portion along the edge of the tarp 14. Stops 30 having an arcuately shaped end portion 32 and a vertically extending upright portion 34 are suitably secured to the top of the side wall 18 by screws 36 or the like. The arcuate portion engages the tube 28 along the edge of the tarp 14 while the vertically upright portion 34 retains the tarp apparatus 10 on top of the truck box 12 when in an uncovered or stored position. Additional fasteners 38, not having an upright portion, may be positioned at spaced intervals along the edge of the tarp 14 to assist in securing the tarp 14 to the truck box 12. It will be appreciated that other suitable apparatus for securing the tarp 14 along its longitudinal edge to the truck box 12 may be utilized in keeping with the principles of the present invention.

The releasable hold-down apparatus 24 as illustrated in FIGS. 1 and 3 includes a plurality of hooks 40 attached at spaced intervals to the side 22 opposite the side 18 of the truck box 12. As illustrated in FIGS. 4 through 6, the hooks 40 include a generally U-shaped portion 42 including leg portions 44,46 and an arcuate portion 48. The hooks 40 further include integral with the U-shaped portion 42 a brace portion 50 including leg portions 52,54. The hooks 40 are suitably secured to the truck box side wall 22 below the top edge thereof by screws or the like.

As illustrated in FIG. 3, the longitudinal edge of the tarp 14 adjacent the hooks 40 includes a hem portion 56 defining a sleeve or aperture for receipt of a rod member 58. In the preferred embodiment, the rod member 58 is a one-half inch diameter, solid fiberglass rod. At predetermined spaced locations along the edge of the tarp 14, rectangular apertures are present to enable flexible web straps 60 to be attached to the rod member 58. As illustrated in FIGS. 3 through 6, the straps 60 include a hem portion 62 at the end thereof adapted for receipt of the rod member 58. Preferably the rod member 58 has sufficient structural integrity such that it will withstand the forces exerted thereon by the straps 60 when the tarp 14 is tightened by the crank apparatus 26.

The straps 60 are attached at their other end to a hollow tubular roll-bar 64 by a hem portion 66 adapted for receipt of the roll-bar 64. The straps 60 are fixedly secured to the roll-bar 64 in a suitable fashion, e.g. a rivet and washer combination (not shown), such that the roll-bar 64 will not slip in the hem of the straps 60. The straps 60 are of such a length that when fully extended the roll bar 64 is positioned below the bottom of the leg portion 44 as illustrated in FIG. 5. Additionally, the tarp 14 is of such a width that when fully stretched across the truck box opening, the rod 58 rests generally against leg portion 52 of the hooks 40 as illustrated generally in FIGS. 4 through 6. Thus, when the tarp 14 is fully unrolled so as to cover the truck box 12, the rod member 58 will be held outwardly from the side of the truck box 12. As a result, the roll bar 64 will similarly be displaced outwardly from the side of the truck box as illustrated in FIG. 5 such that the roll bar 64 may either be rolled up into the U-shaped portion 42 of the hooks 40 as illustrated in FIG. 6 or rolled up back over the hooks 40 as illustrated in FIG. 4. The leg portions 52

thus function both as a support for the hooks 40 and as a structure for displacing the rod 58 and the roll bar 64 away from the side of the truck box 12. The leg portions 52, by retaining the rod member 58 away from the side of the truck box 12, assist in positioning the roll bar 64 in all the hooks 40 when tightening the straps 60 and further assist in releasing the roll bar 64 from the hooks 40 when the straps 60 are loosened and the tarp 14 is rolled up to its stored position. The leg portions 52, in addition to other functions, thus serve to generally align the roll bar 64 with the leg portions 42 of the hooks 40 such that the roll bar 64 is readily positioned in the hooks 40 for tightening the straps 60 and readily released from the hooks 40 thereby releasing the straps 60 such that the tarp 14 may be rolled up. As illustrated in FIG. 6, in certain applications spacer members 59 may be utilized to position the hooks 40 away from the side 22 of the vehicle 12.

The roll bar 64 in the embodiment illustrated, thus assists in attaching/releasing the straps 60 to/from the hooks 40 and tightening/loosening the straps 60. This readily enables one person to attach/release a plurality of straps and tighten or loosen the same by operating one end of the roll bar 64.

As illustrated in FIG. 3, the roll bar 64 extends generally parallel to the edge of the tarp 14. Preferably, the roll bar 64 has a hollow tubular configuration. When the tarp 14 is in a covered position, the roll bar 64 is retained in place by the hooks 40. Preferably, the hooks 40 and the roll bar 64 are both made from a metal such that there is minimal friction between the hooks 40 and the roll bar 64 and therefore little resistance to the tarp 14 being tightened by rolling the roll bar 64 up into and against the arcuate portion 48 of the hooks 40. Furthermore, the roll bar 64 is displaced from the tarp 14, such that the tarp 14 does not engage the hooks 40. Consequently, there is no fabric wear of the tarp 14 as would be the case if the tarp 14 was wrapped around the roll bar 64.

While in the preferred embodiment shown, the web straps 60 are made from nylon, it will be appreciated that the web straps 60 might be made from other materials and in particular an elastic material. Elastic web straps 60 would further assist in retaining the roll bar 64 in the hooks 40 if the load should settle.

As further illustrated in FIGS. 3 and 7, the crank apparatus 26 for rolling and unrolling the tarp 14 is positioned at the back end of the truck box 12. The roll bar 64 has suitably attached to its back end, which extends a predetermined distance beyond the end of the truck box 12, a spline shaft 70 as illustrated in FIG. 7. In the preferred embodiment shown, the spline shaft has fifteen (15) separate splines. The crank apparatus 26 includes an elongated tubular member 72 having a U-joint assembly 74 attached to one end and a handle 76 attached to the other end as illustrated in FIG. 1.

In the embodiment shown, the U-joint assembly 74 locks at quarter turns. Suitably connected to the U-joint assembly 74, is a locking collar assembly 80 which is utilized to retain the crank apparatus 26 on the spline shaft 70. The locking collar assembly 80 includes bearings (not shown) which are pushed radially inward upon pushing forward on the locking collar assembly 80 as generally indicated by arrow 82. The bearings are displaced into the groove 84 defined in the spline shaft 70 so as to retain the crank apparatus 26 on the spline shaft 70. To release the crank apparatus 26, the locking collar assembly is pulled backward in a direction opposite to that indicated by arrow 82. The bearings are then released and spring radially outward such that the crank apparatus 26 can be removed from the spline shaft 70. It will be appreciated that the U-joint assembly 74 and the spline shaft 70 provides for much flexibility in adjusting the orientation of the U-joint assembly 74 with respect to the roll bar 64. This enables the crank apparatus 26 to be readily attached to the roll bar 64 such that the tarp 14 is sufficiently taught when the crank apparatus 26 is placed in its stored position at the back of the truck box 12 as illustrated in FIG. 1. When stored, the tubular member 72 is retained by a bracket 86 on a back side 88 of the truck box. When the tarp 14 is rolled up and stored along its secured edge such that the truck box is open, the elongated tubular member will be retained by a bracket 90, similar to the bracket 86. It will be appreciated, that the roll bar 64 must extend beyond the back of the truck box 12 to enable clearance for the crank apparatus 26. Other suitable retainer brackets may be utilized in keeping within the principles of the present invention.

As illustrated in FIG. 8, the front end of the roll bar 64 is connected to a stretch cord 92 which is suitably fastened to the side 22 of the truck box 12 by a bracket 94. The stretch cord 92, as illustrated in FIG. 8, will be inserted into the end of the hollow roll bar 64 and extend a predetermined distance through the roll bar to an aperture in the roll bar 64 (not shown) where the stretch cord 92 will be secured in the roll bar 64. In the preferred embodiment, the stretch cord 92 extends approximately twelve (12) feet through the roll bar 64. The stretch cord 92 is made from a resilient material and assist in rolling and unrolling the roll-up tarp apparatus 10 of the present invention. The stretch cord 92, by maintaining tension on the end of the roll bar 64, assists in keeping the tarp 14 aligned during the rolling process and assists in helping the roll bar 64 clear the top of the framework 16 during the rolling and unrolling process. The stretch cord 92 also serves to function as a shock absorber to a certain extent.

The present invention may be installed on the truck box by the user due to its relative ease of installation and assembly. The user, when installing the roll-up tarp apparatus 10, first positions and suitably attached the framework 16 on the top of the truck box 12. The tube 28 and rod member 58 are inserted along the side edges of the tarp 14. When installing the rod member 58, the web straps 60 are positioned thereon and the roll bar 64 is inserted through the other end of the straps 60. The tarp 14 is then fixedly secured to the top of the truck box 12 along the side 18 by the use of the snaps 30 and fasteners 38. Next, the crank apparatus 26 may be assembled. The tubular member 72 is fixedly secured to the handle 76 by spot welding or the like and the U-joint assembly 74 secured to the other end of the tubular member 72 by screws or the like. If not previously attached, the spline shaft 70 is fixedly secured to the end of the roll bar 64. The crank apparatus 26 is then readily attached to the spline shaft 70 by pushing forward on the locking collar assembly 80 as generally indicated by the arrow 82. (The U-joint assembly 74 with locking collar assembly 80 is a commercially available item and may be obtained from Weasler Engineering, Inc., Box 558, West Bend, Wis. 53095.) The locking collar assembly 80 provides for the quick and easy connection of the crank apparatus 26 to the roll bar 64. It will further be appreciated, that the multiple splined spline shaft 70 and the U-joint assembly 74 allows the orientation of the

crank apparatus 26 to be adjusted as required for attachment in the brackets 86,90 on the back end 88 of the truck box 12. Next, the hold down hooks 40 are attached to the side 22 of the truck box 12. This may be accomplished by hanging the hold down hooks 40 on the roll bar 64 at locations between the web straps 60. The roll bar 64 is then rolled counterclockwise until the rod member 58 is positioned along leg portions 52 of the hooks 40. The hooks 40 are then attached at this location to the side of the truck box 12. Once the hooks 40 are attached, the tarp 14 is unrolled and stretched tight with the roll bar 64 positioned under the hooks 40. The handle bracket 86 can then be properly positioned on the back of the truck box. The tarp 14 can then be rolled up into the uncovered or stored position and the crank apparatus properly positioned such that the bracket 90 can be attached to the back of the truck box 12. The stretch cord 92 may then be attached to the side of the truck box.

In use, the tarp 14 may be rolled up and stored along the longitudinal top edge of the truck box 12 when not being used or when necessary to enable access to the truck box 12. To cover the truck box 12, the user may simply grasp the handle 76 at the end of the tubular member 72 and roll the roll bar 64 in a counterclockwise direction by turning the handle 76 such that the tarp 14 is unrolled. The operator, during the covering process, continues to rotate the roll bar 64 in a counterclockwise direction such that the roll bar 64 passes the hooks 40 and continues rolling the roll bar 64 in a counterclockwise direction until the roll bar 64 engages the arcuate portion 48 of the hooks and the tarp 14 is sufficiently tightened. The crank apparatus 26 may then be stored for transit at the back end of the truck box as illustrated in FIG. 1.

It will be appreciated that the present invention provides a roll-up tarp apparatus which does not subject the tarp 14 to extensive wear along its free edge. This is due to the fact that the roll bar 64 is not directly attached to the tarp 14, but rather by a plurality of web straps 60. Furthermore, the exposed outer surfaces of the roll tube 64 preferably has a metal surface or such a surface which will rotatably slide on the arcuate portions 48 of the hooks 40, which also are preferably made from metal or other suitable material, with little resistance or minimum friction. Consequently, there is little opposing force exerted on the crank apparatus 26 as the operator stretches the tarp 14 tight. As a result, a very tightly stretched tarp 14 is obtainable. Furthermore, the leg portions 44 of the hooks 40 extend a substantial distance downward beyond the roll bar 64 so that if the tarp 14 is utilized to cover a load which is heaped above the framework 16, the hooks 40 will not release the roll bar 64 even if the load should settle and the tarp 14 slightly loosen. Further, if the straps 60 are resilient, they will assist in keeping tension on the tarp 14.

Additionally, the present invention does not place an unwanted strain upon the crank apparatus 26 which results when there are forces which oppose the tightening of the tarp 14. This is especially true in those systems wherein the tarp is directly connected to the roll bar so as to bind and bunch up between the roll bar and a latch plate. In the present invention, there is very little resistance so as to minimize any spring effect.

Furthermore, the locking assembly collar 80 provides quick attachment of the crank apparatus 26 to the roll bar 64 without necessitating any extra locking pins or the like.

Furthermore, the roll-bar 64 in one embodiment of the present invention functions as a strap tightener/loosener apparatus and as an apparatus for rolling and unrolling the tarp 14. When functioning as a strap tightener/loosener, the roll bar 64 does not engage the tarp 14 and enables generally simultaneous, uniform tightening of the straps 60.

It is to be understood, however, that even though the above numerous characteristics and advantages of the invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principle of the invention, to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A roll-up tarp apparatus for an open truck box or the like comprising:

(a) a tarp made of a flexible material, said tarp having a length approximate that of the length of the truck box, said tarp further having a width somewhat greater than the width of the truck box;

(b) means for fixedly securing a first side edge of said tarp to a first longitudinal side of the truck box;

(c) an elongated roll-bar member attached to a second side edge of said tarp by a plurality of elongated, flexible strap members, said elongated roll-bar member being displaced from said second side edge of said tarp;

(d) crank means interconnected to said elongated roll-bar member for rolling said elongated roll-bar member transversely of the open truck box so as to cover the truck box with said tarp or uncover the truck box, said crank means including an elongated crank handle interconnected to said elongated roll-bar member and further including retaining bracket means positioned proximate an end of the truck box for retaining the crank handle when said tarp is in a covered position; and

(e) a plurality of spaced hook members displaced downwardly from the top edge of a second longitudinal side of the truck box and adapted for receipt of said elongated roll-bar member, said hook members cooperating with said crank means for retaining said elongated roll-bar member when said tarp is in a covered position.

2. A roll-up tarp apparatus in accordance with claim 1, wherein said hook-like members include a generally U-shaped portion.

3. A roll-up tarp apparatus in accordance with claim 2, wherein said hook-like members further include a portion for displacing said second side edge of said tarp away from the side of the truck box.

4. A roll-up tarp apparatus in accordance with claim 1, wherein said second side edge of said tarp includes a hem portion including a rod member positioned therein, said flexible strap members being attached at a first end to said rod member and at a second end to said elongated roll-bar member, said elongated member being spaced from said tarp.

5. A roll-up tarp apparatus in accordance with claim 1, wherein said elongated roll-bar member is hollow, a first end of said elongated member being connected to the truck box by a resilient cord, said resilient cord being inserted a predetermined distance into said elongated member.

6. A roll-up tarp apparatus in accordance with claim 1, wherein said crank means includes a U-joint and locking collar assembly mounted on the end of the crank handle, said locking collar assembly being constructed and arranged so as to retain said U-joint assembly on a spline shaft positioned at a second end of said elongated roll-bar member.

7. A roll-up cover assembly for an open container or the like, comprising:

(a) a flexible cover, said cover being secured at a first side edge to a first side of the container, said flexible cover being overlapped on itself along a second side edge opposite said first edge to form a sleeve adapted for receipt of an elongated rod;

(b) a tubular member attached to said rod by a plurality of flexible, elongated straps, said tubular member being displaced from the edge of said tarp;

(c) a plurality of hooks attached to a second side of said container for receiving said tubular member when said container is enclosed by said cover; and

(d) crank means interconnected to said tubular member for rolling said tubular member in a first direction to enclose said container and in a second direction to uncover said container, said crank means cooperating with said hooks for retaining said tubular member when said container is enclosed by said cover.

8. A roll-up cover assembly in accordance with claim 7, wherein said crank means includes a U-joint assembly connected to the end of a crank handle, said U-joint assembly being operatively connected to a first end of said tubular member, said crank means further including retaining bracket means proximate an end of the container for retaining the crank handle when said container is enclosed by said cover.

9. A roll-up cover assembly in accordance with claim 8, wherein said first end of said tubular member includes a spline shaft member, said U-joint assembly further including a locking collar adapted for releasably locking said U-joint assembly onto said spline shaft.

10. A roll-up cover assembly in accordance with claim 9, wherein a second end of said tubular member is attached to a resilient cord, said resilient cord being further attached to the container.

11. A roll-up tarp apparatus for an open truck box or the like, comprising:

(a) a tarp made from a flexible material;

(b) a framework positioned between first and second sides of the truck box for supporting the tarp;

(c) means for securing a first edge of said tarp to the first side of said truck box;

(d) securing means for releasably securing said tarp to the second side of the said truck box;

(e) an elongated tubular member being attached to a second edge of the tarp by a plurality of straps so as to be displaced from the second edge of the tarp, said elongated tubular member cooperating with said securing means for releasably securing said tarp; and

(f) crank means operatively connected to said tubular member for rolling or unrolling said tarp over said framework, said crank means including an elongated handle connected to a U-joint assembly at one end thereof, said U-joint assembly including a collar assembly for releasably locking said U-joint assembly onto a spline shaft attached to an end of said tubular member.

12. A roll-up cover assembly for an open container or the like, comprising:

(a) a flexible cover, said cover being secured at a first side edge to a first side of the container;

(b) a plurality of straps attached at a first end to a second side edge of said flexible cover, said straps being interconnected at a second end to an elongated roll-bar member displaced from the second side edge of said flexible cover;

(c) crank means interconnected to said elongated roll-bar member for rolling said elongated roll-bar member in a first direction to enclose said container and in a second direction to uncover said container; and

(d) hook means positioned on a second side of the container for receiving said elongated roll-bar member, said hook means cooperating with said elongated roll-bar member when said elongated roll-bar member is rolled upward into said hook means by said crank means to tighten the straps such that the tarp is drawn tant.

13. A roll-up cover assembly in accordance with claim 12, further including means for vertically aligning said elongated roll-bar member with a plurality of hook members positioned on the side of the container such that said tubular member member may be readily and simultaneously positioned in said hook members or removed therefrom.

14. A roll-up cover assembly in accordance with claim 13, wherein said means for vertically aligning said elongated roll-bar member includes a structure attached to the side of the container for displacing the elongated roll-bar member away from the side of the container.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,505,512

DATED : March 19, 1985

INVENTOR(S) : Steven C. Schmeichel et al.

It is certified that error appears in the above—identified patent and that said Letters Patent is hereby corrected as shown below:

Column 2, line 12, "in" should be --is--;

Column 2, line 42, "enlongated" should be --elongated--;

Column 3, line 66, "to" (second occurence) should be --so--;

Column 5, lines 5 and 13, "sraps" should be --straps--;

Column 6, line 9, "taught" should be --taut--;

Column 6, line 33, "assist" should be --assists--.

Signed and Sealed this

Seventeenth Day of *June 1986*

[SEAL]

Attest:

Attesting Officer

DONALD J. QUIGG

Commissioner of Patents and Trademarks

APPENDIX C

(12) **United States Patent**
Swanson et al.

(10) **Patent No.: US 6,513,856 B1**
(45) **Date of Patent: Feb. 4, 2003**

(54) **ROLL ASSIST MECHANISM FOR TARP SYSTEMS**

(75) Inventors: **Bradford P. Swanson, Yankton, SD (US); Christopher J. McCallum, Yankton, SD (US)**

(73) Assignee: **Shur Company, Yankton, SD (US)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/109,492**

(22) Filed: **Mar. 28, 2002**

(51) **Int. Cl.**[7] **B60P 7/04**
(52) **U.S. Cl.** **296/98; 296/100.15; 296/100.16**
(58) **Field of Search** 296/98, 100.15, 296/100.16, 100.18

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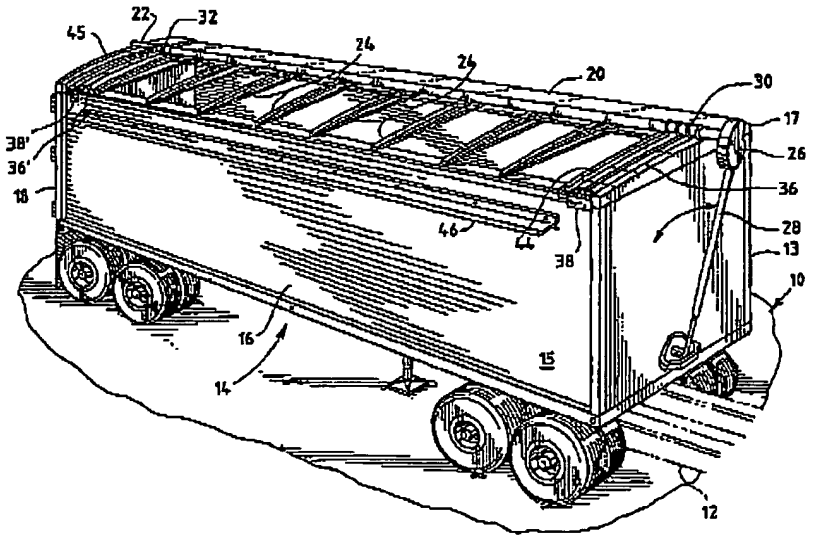
Assistant Examiner—Jason Morrow
(74) *Attorney, Agent, or Firm*—Jones, Day, Reavis & Pogue

(57) **ABSTRACT**

In a tarp system used to cover an open container such as a truck, the tarp being connected on one longitudinal edge to a roll bar, an improved mechanism for assisting movement of the roll bar comprises one or more constant force springs, each spring attached at one end to a longitudinal side of the container and at the other end to a reel mounted on the roll bar. When the roll bar is at one side of the container, the tarp is rolled around the roll bar and the constant force springs are extended. As the bar rolls across to the opposite side, the tarp is unrolled to cover the container opening, and the constant force springs wind into a coil around the reel.

23 Claims, 5 Drawing Sheets



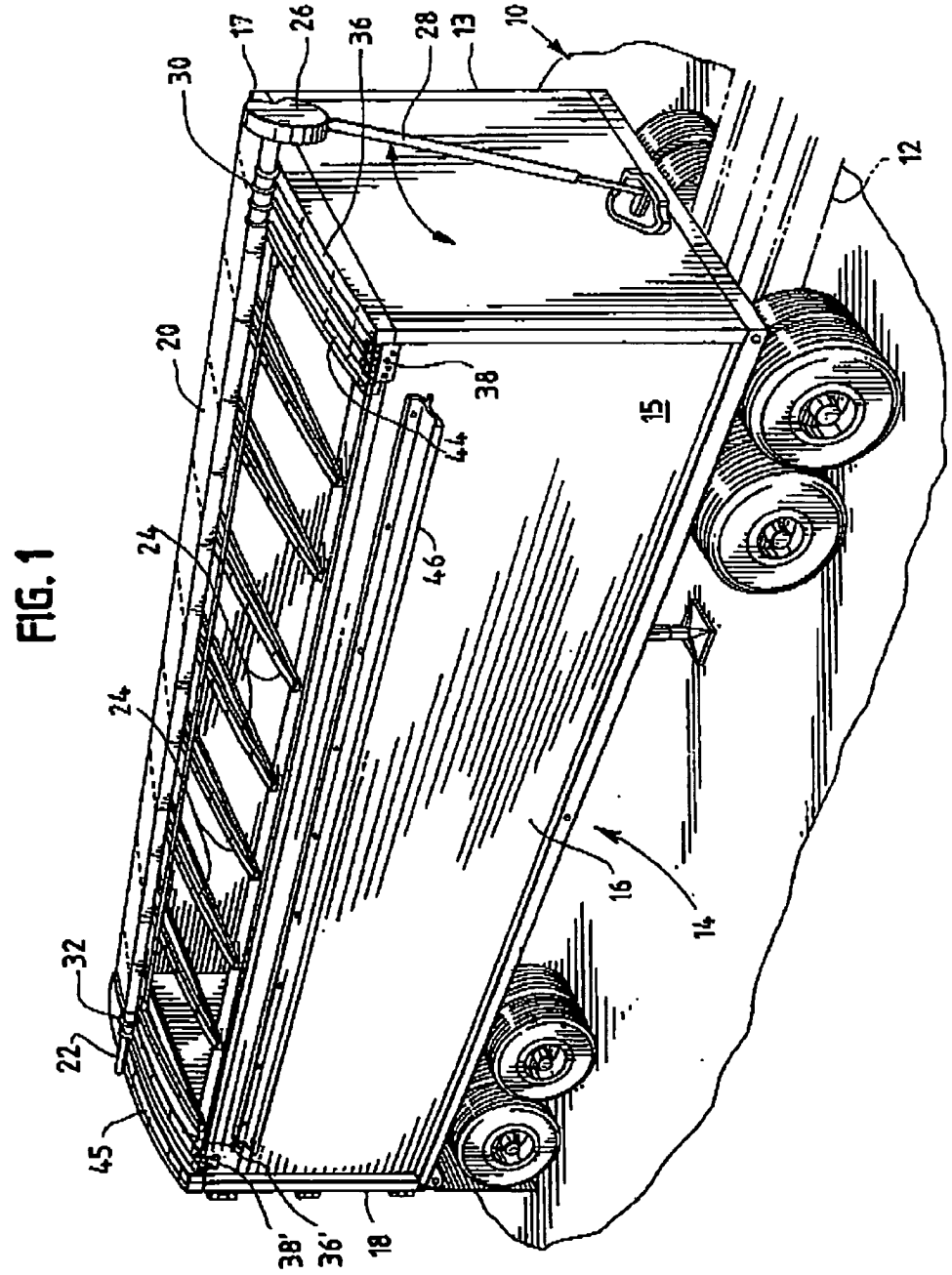


FIG. 1

FIG. 2

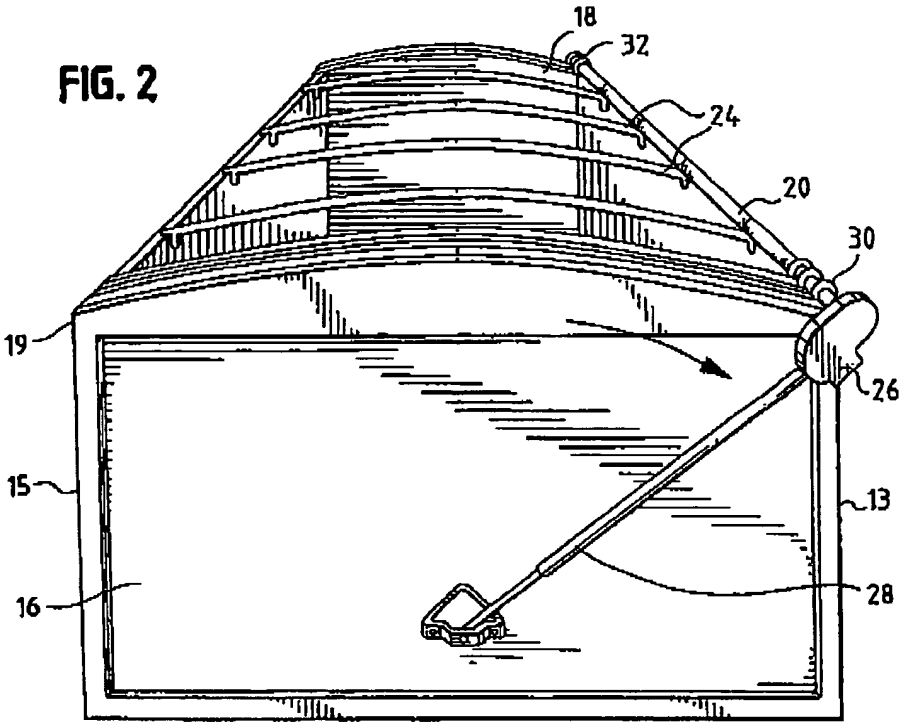


FIG. 3

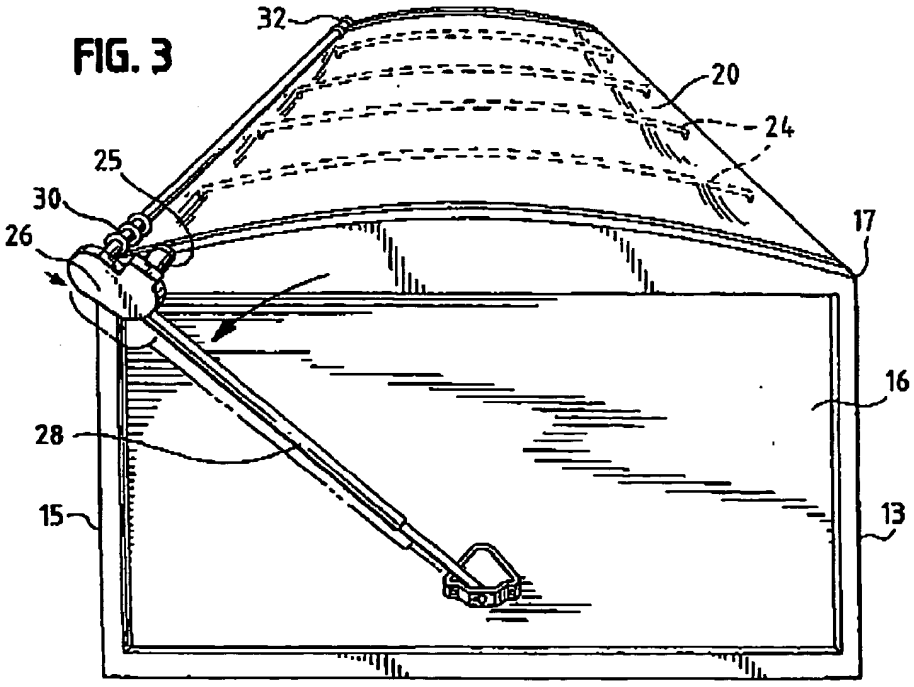


FIG. 4

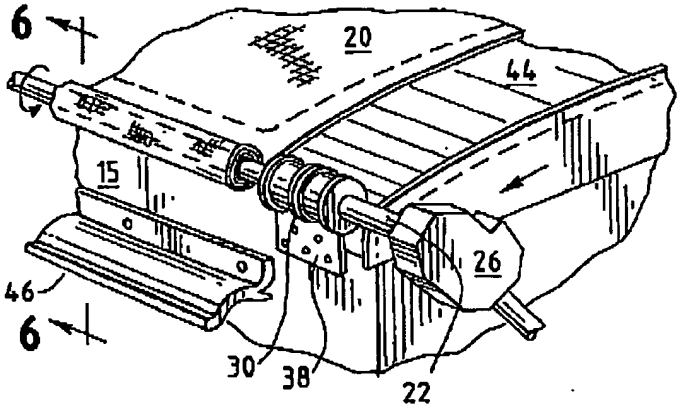


FIG. 5

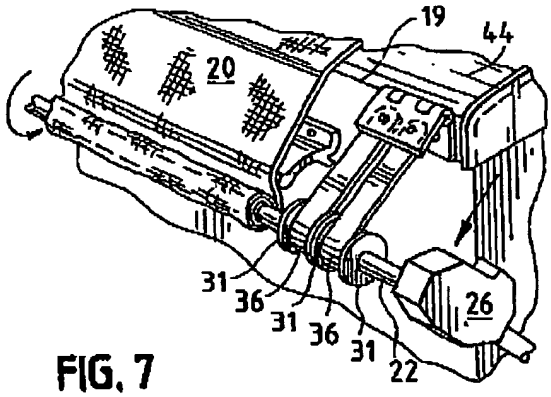


FIG. 6

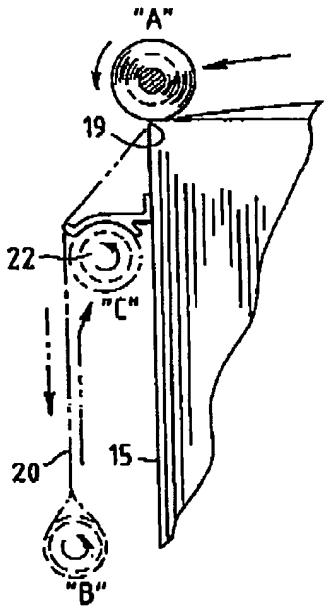


FIG. 7

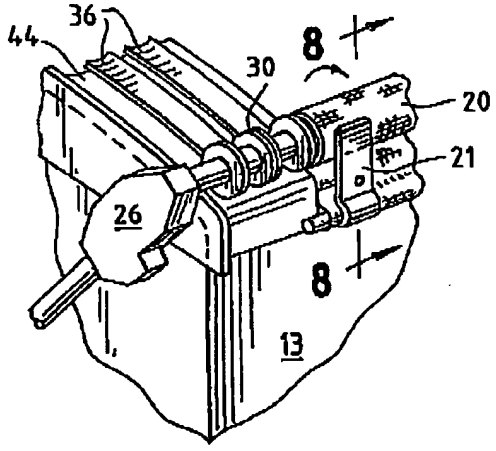


FIG. 8

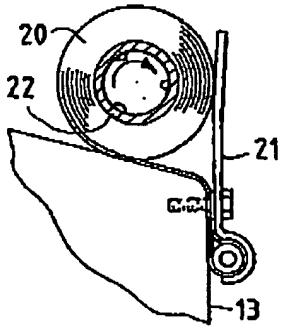


FIG. 9

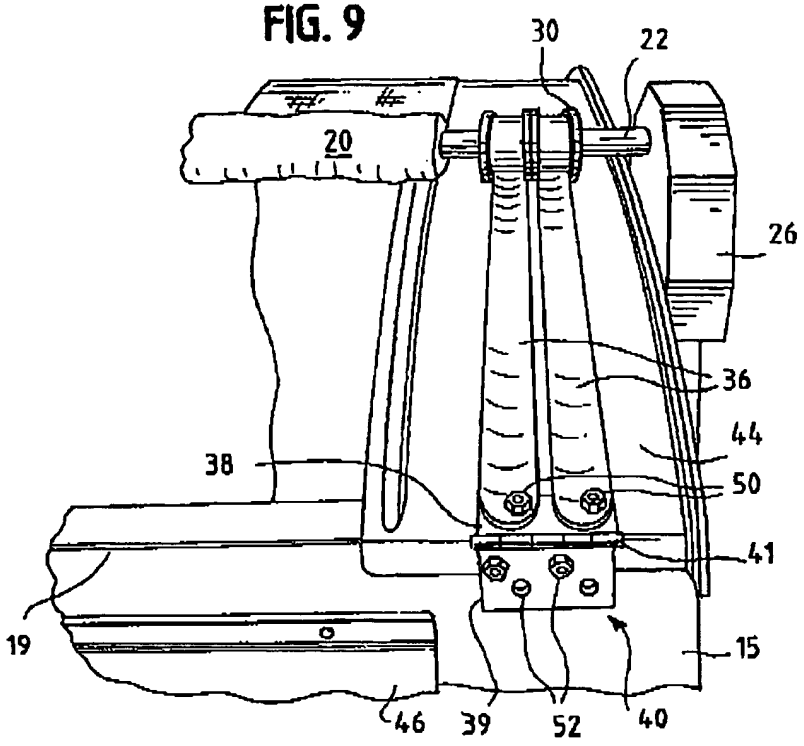

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FIG. 10

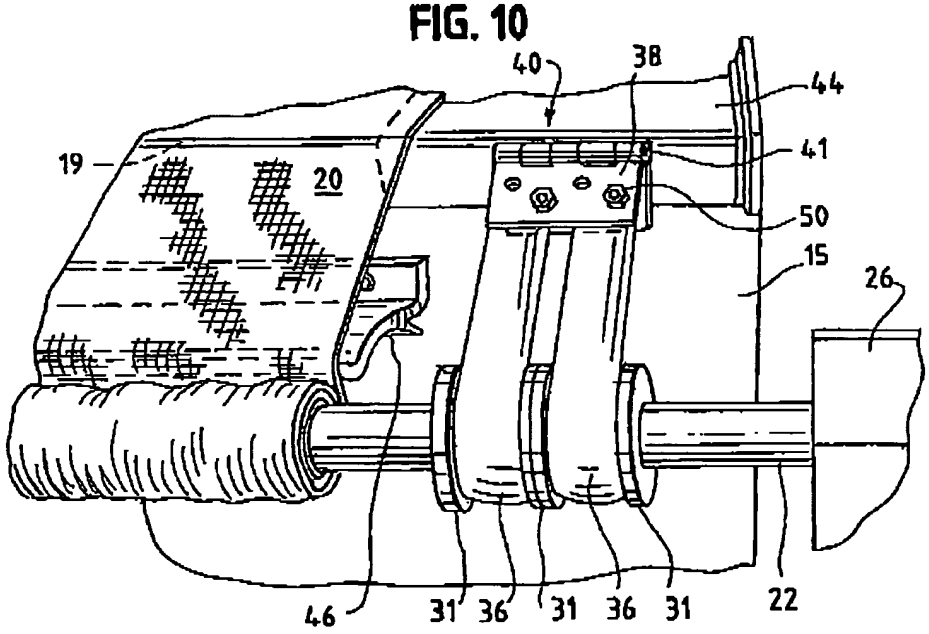
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FIG. 11

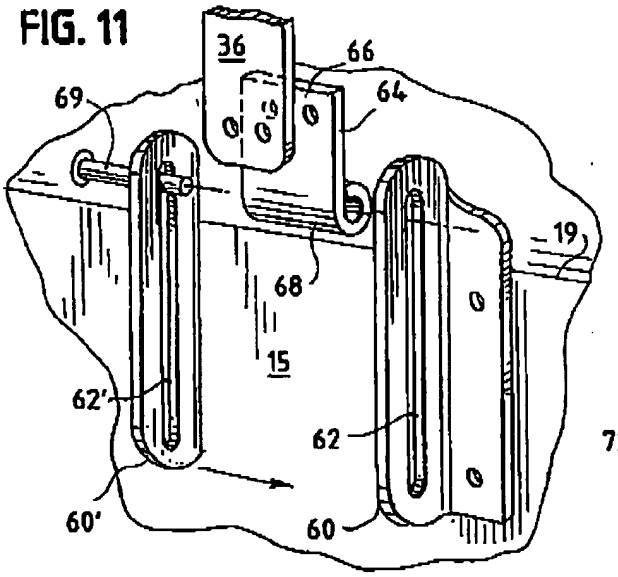


FIG. 12

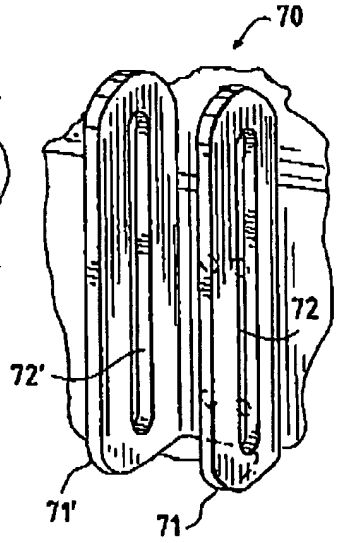


FIG. 13

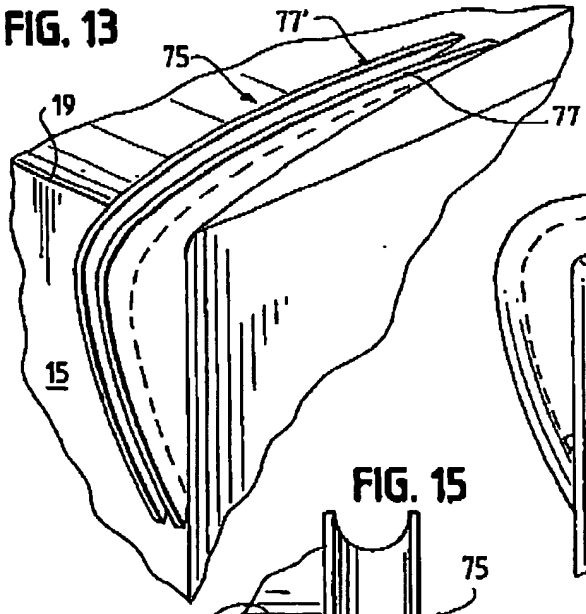


FIG. 14

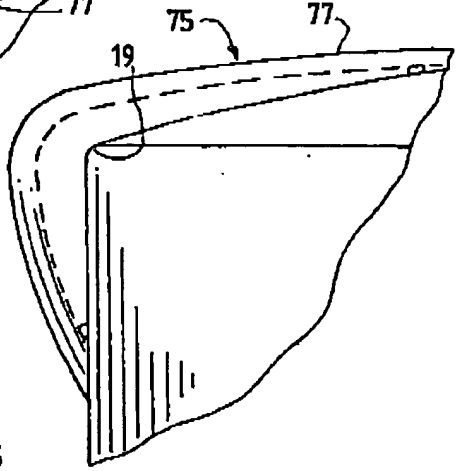
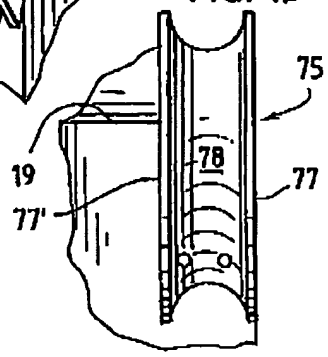


FIG. 15



ROLL ASSIST MECHANISM FOR TARP SYSTEMS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to tarp systems including fabric or other flexible material and associated metal hardware for covering an open top truck box, railcar, other vehicle or stationary container. More particularly, the invention relates to mechanisms for facilitating the rolling or unrolling of flexible material between a rolled up condition and the unfurled condition to cover an opening.

2. Description of the Prior Art

Various types of truck, trailer, railcar and moveable and stationary container bodies are designed to be loaded through an open top. Such bodies are typically used to haul or store hardware, equipment, produce, grain, stone, earth or refuse. It is desirable to use tarpaulins or other coverings to close the open tops of such containers. The tarpaulins serve to shelter the truck, trailer or container contents against the elements and to maintain the contents in the body.

Several systems are known for reversibly covering the open tops of vehicles, boxes and containers with tarpaulins. Typically, the covering is unrolled from a long tube or bar by manipulation of the associated metal hardware. The roll tube or roll bar is moved between an open, rolled-up position in which the covering is wrapped around the tube, exposing the interior of the container, and a closed, unfurled position in which the covering is spread over the top of the container.

Various ways have been employed to move the tube across the opening and to secure the free end near one edge of the vehicle, box or container top. The tube usually is rotated either manually or by an electric motor. These systems tend to use end caps and metal bows spanning the width of the opening to support the covering along the length of the open top.

An example of such a system is shown in U.S. Pat. No. Re. 31,746 issued to Dimmer et al., which is incorporated by reference herein in its entirety. As shown in the patent, a covering is attached along one lengthwise edge to a tube. One end of the tube is connected by a universal joint to a crank. The universal joint is reversibly attached to the roll tube by a spline and pin or similar mechanism.

An operator at ground level can turn the crank causing the tube to roll over the top of the container, such that the covering rolls up lengthwise on the tube. As a result, the material will uncover or cover the top of the trailer or container. In this arrangement, the end of the roll tube to which the universal joint and crank arm are attached can be described as the active end because the torque or turning force is applied there. Conversely, the opposite end can be described as the passive end because the torque is applied indirectly through the length of the tube.

A feature of the system shown in U.S. Pat. No. Re. 31,746 (and the commercial embodiment thereof) is an elastic cord (item 78) attached at one end to a narrower plastic tube within the roll tube or roll bar and at the other end to a forward edge of the latch plate (or, alternatively, to the body itself). (See U.S. Pat. No. Re. 31,746, column 4, lines 49–66.) When the roll tube is rolled across the top, the elastic cord pulls the passive end of the tube toward the latching side of the container to tension the end of the roll bar opposite the direct rolling force provided on the active end by the crank. Generally, the tensioning force is greatest when the roll bar is in the open position; this force decreases as the roll bar is moved closer to the latching side.

Another example of a tarp system is disclosed in U.S. Pat. No. 5,487,584, also incorporated by reference herein in its entirety.

Although the use of a resilient cord is intended to assist movement of the passive end of the roll tube, it has some disadvantages. For example, the resilient cord applies variable force as the roll bar moves across the opening. In essence, as the cord is stretched it applies an increasing force at one end of the bar in a different direction than the turning/rolling force applied directly by the crank arm at the opposite end. Also, the elastic cord stretches out over time, loses its pulling force, and is subject to being cut or breaking as a result of overuse or exposure to the elements.

During the opening operation, an imbalance of forces applied at the opposite ends of the roll bar can cause the covering material to be wrapped more tightly around one end of the bar or tube than the material on the other end. This will result in one end progressing more slowly than the other end. As a result, one end of the roll tube tends to advance faster than the other end during opening or closing operations, occasionally resulting in stationary unwinding of the covering from the bar at one end. Such uneven rolling may cause the operator to try to use the crank arm to slide, push or pull one end of the roll bar and associated covering material to advance it to a position even with the other end.

It is an object of the invention to provide an assist mechanism for a rolling tarp system whereby a more even winding or unwinding of the covering on the roll bar is achieved. It is another object of the invention to provide an apparatus where uneven rolling or unrolling is less likely to occur or is avoided altogether. It is a further object of the invention to provide a mechanism that assists with even progression of the two roll bar ends as the bar is rolled across the opening of a vehicle, box or container. Still further it is desirable to provide an assist mechanism that may be retrofitted readily to existing covering apparatus to improve the rolling operation. It is yet another objection of the invention to eliminate the disadvantages of use of the elastic cord, such as fraying, breaking, or loss of elasticity.

SUMMARY OF THE INVENTION

The present invention is an improvement for a tarp system for an open top container, wherein the tarp has first and second longitudinal edges and the container has first and second longitudinal sides, the tarp being attached on one longitudinal edge to the first longitudinal side of the container and on the other longitudinal edge to a roll bar. The roll bar is caused to roll by a force applied on at least one end of the bar. The improvement relates to a mechanism for assisting movement of the roll bar across the opening of the container.

The improvement comprises a roll assist apparatus including at least one reel fixedly attached to one end of the roll bar and a constant force spring having a first end fixedly attached to the reel and a second end attached to the second longitudinal side of the container. The roll bar is adapted to roll across the top of the container between the first and second longitudinal sides. When the roll bar is at the first side of the container, the tarp is rolled around the roll bar so that the top opening of the container is uncovered, and the constant force spring is extended. As the roll bar rolls toward the second longitudinal side of the container, the tarp unfurls to cover the top opening side of the container, and the constant force spring winds into a coil around the reel.

The constant force spring, by its nature, is biased to wind up on itself. This force tends to pull the tarp toward the unfurled position. Unlike a stretch cord, which has an increasing force as the roll bar moves away from the unfurled position, the force applied to the roll bar by the constant force spring is relatively constant over its length. The spring also is highly durable and unstretchable.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other novel features and advantages of the invention will be better understood upon a reading of the following detailed description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a right front perspective view of a trailer shown with a tarp system having a roll assist mechanism constructed in accordance with the principles of the invention, the tractor being partially shown.

FIG. 2 is a front perspective view of a trailer container with the inventive roll assist system in a rolled-up position such that the container opening is uncovered;

FIG. 3 is a front perspective view of a trailer container with the inventive roll assist system in an unfurled position such that the container opening is covered;

FIG. 4 is a partial right front perspective view of the container showing the roll assist system in a nearly unfurled position;

FIG. 5 is a view similar to FIG. 4 but illustrating the roll assist system in a more fully unfurled position;

FIG. 6 is a cross-sectional view taken substantially along the line 6—6 of FIG. 4, and further showing the roll bar in different positions in phantom lines;

FIG. 7 illustrates a partial left front perspective view of a front upper corner of the trailer showing the constant force springs in an extended condition and the tarp in a completely rolled-up condition;

FIG. 8 is a cross-sectional view taken substantially along the line 8—8 of FIG. 7;

FIG. 9 is a side perspective view of an upper portion of the front of the trailer showing the springs in a partially extended condition;

FIG. 10 is a side perspective view of an upper portion of the front of the trailer showing the tarp as fully covering the trailer;

FIG. 11 is a side view of an alternative embodiment of the hinge and mounting for the constant force spring;

FIG. 12 is a second alternative embodiment of the hinge mounting;

FIG. 13 is a perspective view of a corner track for receiving the extended constant force spring over the trailer container to prevent back load on the constant force spring at the edge of the container;

FIG. 14 is a side view of the corner track shown mounted on the trailer container, partially showing the container and end cap; and,

FIG. 15 is a front view of the corner track.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, and initially to FIGS. 1–3, a tractor trailer is partially shown in perspective and designated generally by the reference numeral 10. The tractor trailer 10 comprises a truck tractor 12 adapted to connect to and pull a trailer 14 as well known in the art. The trailer

includes an open-top container 16 particularly suitable for hauling materials such as grain, earth, refuse, or the like, which materials generally are loaded into the container 16 through the open top. The loaded material may be removed from the container 16 through a trap door in the floor (not shown) or through rear doors 18. Container 16 has a first longitudinal side 13 having a top edge 17, and a second longitudinal side 15 having a top edge 19. A similar trailer construction is shown in U.S. Pat. No. Re. 31,746, the disclosure of which is incorporated herein in its entirety.

The illustrated container 16 is provided with a cover system to protect the contents from the elements such as rain, sleet, snow, and to ensure that they are retained within the container 16 during high winds produced by weather or by movement of the trailer 14. The covering system includes a tarp 20 which may be constructed of vinyl, canvas or other flexible materials. Tarp 20 is generally of the same size and shape as the opening of container 16, and has first and second longitudinal edges. One longitudinal edge of tarp 20 is secured to a first longitudinal edge 17 of container 16 by metal hardware known in the art. (See, for example, U.S. Pat. No. Re. 31,746). The second longitudinal edge of tarp 20 is secured to a roll bar or tube 22. Roll bar 22 is substantially the same length as container 16. Suitable bows 24 span the width of the container 16 at spaced intervals to support the tarp 20 over the container 16 when the tarp is unfurled. In FIG. 1, tarp 20 is shown partially unfurled over the top of container 16.

In one preferred form of the covering system, an electrically operated drive assembly is used to roll the roll bar 22 back and forth between longitudinal edges 17 and 19 of container 16, and thus roll up or unroll the tarp 20 over the container 16. The drive assembly comprises preferably a 12 volt DC electric motor 25 (FIG. 3) connected to a gear reduction mechanism 26 to which the roll bar 22 is attached. The motor 25 and gear reduction mechanism 26 are supported on a telescoping tube assembly 28 that is pivotably attached to the front of the container 16. As illustrated in FIGS. 1–3, an operator may activate the motor 25, which is preferably of a reversible type, to roll the roll bar 22 from edge 19 to edge 17, causing the tarp 20 to be rolled up on the roll bar 22 thereby uncovering the container 16. When rolled in the opposite direction the tarp 20 is unfurled to cover the open top.

In accordance with the invention, the rolling motion of the roll bar across the top of the container is facilitated by one or more constant force springs. As known in the mechanical arts, the term "constant force spring" is used to describe a strip of flat material that has been wound to a given curvature so that in its relaxed condition it is in the form of a tightly wound coil or spring. When deflected, the spring material straightens as it leaves the coil. The straightened length of spring stores the spring's energy through its tendency to assume its natural radius.

The illustrated embodiment of a roll assist system includes a double reel member 30 fixedly attached to the forward end of the roll bar 22 and a single reel member 32 fixedly attached to the rearward end of the roll bar 22. The reels 30, 32 may be formed from suitable metallic materials, molded thermoplastic, or other plastic materials. A pair of constant force spring members 36 in the form of substantially flat flexible strips are fixedly attached at one end thereof to the double reel member 30. Similarly, a single constant force spring member 36' is fixedly attached to the single reel member 32. The opposite ends of the constant force spring members 36 and 36' are attached to hinge plates 38 and 38', mounted on container side 15 with hinge pins 41

aligned with longitudinal edge 19 (FIGS. 4, 5). Alternative means for pivotably mounting the ends of the springs to container side 15 are discussed below.

Preferably the constant force spring members 36, 36' suitable for use in the instant invention are made from a high yield metal such as 301 stainless steel and having a constant pull force of about 30 pounds, although the invention is not so limited. The two springs 36 at the forward end of the container 16 are effective to assist movement of tarp 20, motor assembly 25, and gear reduction mechanism 26. It can be appreciated that a single, larger spring would be an effective alternative.

As the constant force spring 36 is unwound from the reel 30, its tendency is to coil back up on itself on the reel. The pull back force depends on the material thickness and width as well as how it is wound. Constant force springs which can be used in the practice of the invention are commercially available from John Evans' Sons, Inc. of Lansdale, Pa., and other suppliers.

In a preferred embodiment, each 301 stainless steel constant force spring is approximately 0.022 inches thick and about 4.00 inches wide. Typically, the spring is long enough to at least span the width of an opening of a standard trailer container, i.e., the distance between first longitudinal edge 17 and second longitudinal edge 19. A spring with these specifications can be made to exert an approximately constant force of 33 lbs. on the roll bar 22 in the direction of side 15. This 33 lbs. force does not vary significantly as reels 30, 32 are rolled from one side of the opening to the other.

The reels 30, 32 preferably each have a 2 inch cylindrical hole which mates with the 2 inch diameter roll bar 22 to which it is attached in ways well known in the art. Preferably, the reels have flanges 31, which are preferably about five inches apart, one inch more than the four inch width of the springs 36, 36' to accommodate the spring and to assure that the spring is evenly wound onto itself. The flanges 31 are preferably about ¼ inch thick. The distance from the outside of one flange to the outside of the other, therefore, is 6 inches in the preferred embodiment. Typically, the flanges are about one inch deep, a depth that assures that the flanges will be at least as high off the reel as the spring when it is completely wound around the reel.

The operation of the roll assist system now can be appreciated with reference to FIGS. 4–6 which illustrate the roll bar 22 with forward double reel member 30 in various positions together with the constant force spring members 36 in various extended and retracted positions. An aspect of the invention is that the container 16 preferably is provided with forward and rearward panel members or end caps 44 and 45 (see FIG. 1) which are helpful in supporting the springs 36 and 36', respectfully, when the tarp 20 is in the rolled up condition and the springs are extended. These end caps 44, 45 cover opposed ends of the container 16 and may be of a sheet metal material or can even be formed of the same flexible material as the tarp 20.

FIGS. 4–6 illustrate the roll assist system in a position wherein the tarp 20 is in a nearly completely unfurled position (FIG. 4, FIG. 6, position A) and in a more fully unfurled position (FIG. 5, also illustrated in phantom in FIG. 3). In the fully unfurled position the hinge plates 38, 38' to which the spring members 36 are fixedly attached rotate and allow the roll bar 22 to seat underneath a longitudinal latch plate or ledge 46 (FIG. 6, position C) attached on side 15 near second lengthwise edge 19 of the container 16.

FIGS. 7 and 8 illustrate the roll bar 22 with the tarp 20 fully wound thereon, thereby opening the top of the container 16. In this position of the roll bar 22, the constant force spring members 36 are fully deployed from the reel member 32 and extend across the full width of the end cap 44 and container 16. The rolled tarp 20 abuts stop member 21 mounted to side 13 and extending above edge 17 of container 16.

FIGS. 9 and 10 illustrate in detail the construction and function of the hinge plate 38 which is essentially identical to the structure and function of hinge plate 38'. Each hinge plate 38 comprises a first plate portion 39 fastened by suitable screws or rivets 52 to the side 15 of the container 16, and a second plate portion 40 that rotates relative to first plate portion 39 along hinge pin 41. Hinge pin 41 is substantially aligned with edge 19 of side 15. Constant force spring members 36 are each fastened by suitable screws or rivets at one end thereof to second plate portion 40. When the constant force spring members 36 are in an extended condition, as shown in FIG. 9, the second plate portion 40 is open and lays across the top of end cap 44, allowing the spring members 36 to be supported on the end cap 44. When the tarp 20 is more fully unwound from the roll bar 22, as shown in FIGS. 5 and 10, the second plate portion 40 pivots about hinge pin 41 and nearly closes against first portion 39. Roll bar 22 drops past ledge 46 until the tarp is completely unwound and roll bar 22 is in the lowest of the three positions illustrated in FIG. 6 (position B). The roll bar 22 then moves back upward and the tarp 20 rewinds on the roll bar 22, until the roll bar 22 is engaged underneath latchplate or ledge 46, also shown in FIG. 6 (position C). Preferably, longitudinal latchplate or ledge 46 is about four inches, below edge 19, and the lowest position C of FIG. 6 is about 18 inches below edge 19.

FIGS. 11 and 12 illustrate alternative embodiments of means for pivotably mounting an end of a constant force spring to a side of the container. As illustrated in FIG. 11, two stationary brackets 60, 60' of L-shaped cross-section each have a slot 62, 62' in one side thereof. Stationary brackets 60, 60' are mounted to the outer surface of container 16 such that slots 62, 62' are in vertical parallel alignment with one another and extend outwardly from the container side. The upper portions of the slots 62, 62' extend above edge 19 of container wall 15. A sliding bracket 64 has a first flat end 66 adapted to be fixedly connected to the end of constant force spring 36 and a second end in the form of a substantially closed loop 68. Pin 69 is of sufficient length and appropriate diameter to extend through slot 62', substantially closed loop 68, and slot 62. Sliding bracket 66 can slide up and down along slots 62, 62', providing pivotable and vertical movement of the end of constant force spring 36. When sliding bracket 66 is at the bottom of slots 62, 62', roll bar 22 will be seated underneath longitudinal latchplate or ledge 46 (FIG. 6, position C), and when sliding bracket 66 is at the top of slots 62, 62', bracket 66 can rotate to allow constant force spring 36 to extend over the opening of container 16.

FIG. 12 illustrates an alternative configuration of stationary brackets 60, 60'. U-shaped bracket 70 has two parallel legs 71, 71', each being provided with a slot 72, 72'. When bracket 70 is mounted to a side of container 16, slots 72 and 72' will be in vertical parallel alignment with one another. A sliding bracket 66 with pin 69 as shown in FIG. 11 can be attached at one end to an end of constant force spring 36 and move vertically between the legs 71, 71' of bracket 70, while allowing pivoting of the end of the spring.

FIGS. 13–15 illustrate an alternative to the disclosed hinge constructions. End cap 44 is provided at the side 15 of the container 16 with a corner track element 75. Corner track

element 75 is secured at its lower end with mounting means 76, which will be below latchplate 46. Corner track element 75 is also secured at its upper end and to end cap 44 with similar mounting means, not shown. Corner track element 75 comprises side rails 77, 77' disposed on either side of track 78, which is preferably of concave cross-section. Corner track element 75 is disposed directly over reel 30 when the tarp 20 is completely unfurled as illustrated in FIG. 5. Constant force spring 36 is mounted directly to side 15 of the container below corner track element 75. As the roll bar 22 is moved to wind up tarp 20 and uncover the top of container 16, constant force spring 36 unwinds from reel 30 and is guided by corner track element 75 into proper position over end cap 44. Side rails 77, 77' of corner track 75 are spaced from one another so as to extend on either side of constant force spring 36 as spring 36 unrolls.

It can now be appreciated that a roll assist system constructed according to the invention provides a highly effective means for assisting in both rolling up and unrolling a tarp evenly across the length of a roll bar. Thus, the need for an operator to manually push or pull the active end of the roll bar to adjust or straighten the tarp is minimized or eliminated altogether, without the disadvantages of using a stretch cord.

While the present invention has been described in connection with preferred embodiments thereof, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from the true sprit and scope of the present invention. Accordingly, it is intended by the appended claims to cover all such changes and modifications as come within the spirit and scope of the invention.

What is claimed is:

1. A roll tarp system for an open top vehicle or container, the system comprising:

a roll bar;

a flexible material having dimensions approximately matching the dimensions of the open top, the flexible material having first and second longitudinal edges, the flexible material attached along one longitudinal edge to the vehicle or container and along the other longitudinal edge to the roll bar;

a reel fixedly attached to the roll bar;

a constant force spring having a first end fixed to said reel such that the spring is windable thereon, and having a second end mounted to the vehicle or container;

whereby rolling of the roll bar in one direction winds the spring onto the reel and rolling the roll bar in the other direction unwinds the spring from the reel.

2. The roll tarp system of claim 1 wherein the roll bar has two ends, and further comprising an electric motor at one end.

3. The roll tarp system of claim 2 wherein the reel is located near the end of the roll bar where the electric motor is located.

4. The roll tarp system of claim 3 further comprising:

a second reel, the second reel being located near the end of the roll bar opposite where the electric motor is located; and,

a second constant force spring having two ends, one end attached to the second reel and the other attached to the vehicle or container.

5. The roll tarp system of claim 4 further comprising:

a third reel, the third reel located near the end of the roll bar where the electric motor is located; and,

a third constant force spring having two ends, one end attached to the third reel and the other attached to the vehicle or container.

6. The roll tarp system of claim 5 further comprising means for pivotably mounting an end of at least one of the springs to the vehicle or container.

7. The roll tarp system of claim 6 wherein said means comprises a hinge.

8. A roll tarp system for an open top vehicle or container, the opening having longitudinal and widthwise dimensions and edges at its perimeter, the system comprising:

a roll bar having first and second ends;

a flexible material having longitudinal and widthwise dimensions approximately matching the dimensions of the open top, the flexible material attached along one longitudinal edge near to a longitudinal edge of the opening, the flexible material being attached along its opposite longitudinal edge to the roll bar;

means for rolling the roll bar attached to the first end of the roll bar;

a reel attached to the roll bar; and,

a constant force spring adapted for winding on the reel, the spring having length approximately matching the widthwise dimension of the opening, the spring being attached at one end to the reel, and the spring being mounted at the other end to the vehicle or container;

whereby rolling the roll bar in one direction will wind the spring on the reel while unwinding the flexible material from the roll bar, and rolling of the roll bar in the opposite direction will unwind the spring from the reel while winding the flexible material onto the roll bar.

9. The roll tarp system of claim 8 wherein the means for rolling the roll bar is a crank.

10. The roll tarp system of claim 9 wherein the crank is attached to the roll bar by a universal joint.

11. The roll tarp system of claim 8 wherein the means for rolling the roll bar is an electric motor.

12. The roll tarp system of claim 8 further comprising means for pivotably mounting an end of at least one of the springs to the vehicle or container.

13. The roll tarp system of claim 12 wherein said means comprise a hinge.

14. The roll tarp system of claim 8 wherein the first reel is located near an end of the roll bar, and further comprising:

a second reel, the second reel being attached to the roll bar near the other end thereof; and,

a second constant force spring adapted for winding on the second reel, the spring having length approximately matching the widthwise dimension of the opening, the spring being attached at one end to the second reel and at the other end to the vehicle or container;

whereby rolling the roll bar will wind the second spring on the second reel.

15. The roll tarp system of claim 14 further comprising:

a third reel, the third reel being attached to the roll bar near the end where the means for rolling is located; and,

a third constant force spring adapted for rolling on the third reel, the third spring having length approximately matching the widthwise dimension of the opening, the third spring being attached at one end to the third reel and at the other end to the vehicle or container;

whereby rolling of the roll bar will wind the third spring on the third reel.

16. A roll tarp system for reversibly covering an open top of a vehicle or container, the roll tarp system including a roll bar having first and second ends, a flexible material approximately matching the dimensions of the opening, the flexible material attached along one longitudinal side to the roll bar

and along another longitudinal side to the vehicle or container, and means for rolling the roll bar attached to the first end of the roll bar to roll the roll bar along the opening of the vehicle or container, thereby to wind and unwind the flexible material on the roll bar, the improvement comprising:

a reel attached near an end of the roll bar; and,

a constant force spring having length approximately matching the widthwise dimension of the opening and adapted to be wound upon the reel, the spring attached at one end to the reel and at the other end by mounting means to the vehicle or container;

whereby rolling the roll bar in one direction will wind the spring on the reel and rolling the roll bar in the opposite direction will unwind the spring from the reel.

17. The roll tarp system of claim 16 wherein the means for rolling the roll bar is an electric motor and the reel is attached to the first end of the roll bar.

18. The roll tarp system of claim 16 further comprising;

a second reel attached near an end of the roll bar; and,

a second constant force spring having length approximately matching the widthwise dimension of the opening and adapted to be wound upon the second reel, the second spring attached at one end to the second reel and at the other end to the vehicle or container.

19. The roll tarp system of claim 18 further comprising;

a third reel attached near an end of the roll bar; and,

a third constant force spring having length approximately matching the widthwise dimension of the opening and adapted to be wound upon the third reel, the third spring attached at one end to the third reel and at the other end to the vehicle or container;

wherein the third reel is located near the second end of the roll bar.

20. The roll tarp system of claim 16 wherein said mounting means comprises a hinge attached between the spring and the container.

21. The roll tarp system of claim 20 wherein said hinge comprises a first plate portion mounted to said container, and a second plate portion pivotably attached to said first plate portion, an end of said spring being fixedly secured to said second plate portion.

22. The roll tarp system of claim 20 wherein said hinge comprises a pivoting bracket slidably mounted in at least one stationary bracket, an end of said spring being fixedly secured to said pivoting bracket.

23. The roll tarp system of claim 16 wherein said mounting means comprises means for directly mounting an end of said spring to said container, said system further comprising a corner track means mounted at the corner of the top and side of the container, to facilitate winding and unwinding of said spring at said corner.

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